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WRITTEN TEST FOR SELECTION OF EDUCATION ASSISTANT 'A'

Maximum Marks: 100 Maximum Time: 3 hours

Section-A (60 Marks)

(Multiple Choice)

Mark the correct option in the column of the table given in the last. Rough work (if any) may be done in the space provided for the purpose. Please return the question paper/answer sheet to the invigilator within the given time limit. There is no negative marking. Question numbers 1 to 60 carry 1 mark each.

Q1. A short pulse of white light is incident from air to a glass slab at normal incidence. After travelling through the slab, the first colour to emerge is
(a) blue (b) green
(c) violet (d) red

Q2. Which of the following statements about a compound is incorrect?
(a) A molecule of a compound has atoms of different elements.
(b) A compound cannot be separated into its constituent elements by physical methods of separation.
(c) A compound retains the physical properties of its constituent elements.
(d) The ratio of atoms of different elements in a compound is fixed.

Q3. Which metal ion is a constituent of chlorophyll?
(a) Iron (b) Copper
(c) Magnesium (d) Zinc

Q4. A body is falling freely under the action of gravity alone in vacuum. Which of the following quantities remain constant during the fall?
(a) Kinetic energy.
(b) Potential energy.
(c) Total mechanical energy.
(d) Total linear momentum.

Q5. In which of the following, functional group isomerism is not possible?
(a) Alcohols (b) Aldehydes
(c) Alkyl halides (d) Cyanides

Q6. Growth can be measured in various ways. Which of these can be used as parameters to measure growth
(a) Increase in cell number (b) Increase in cell size
(c) Increase in length and weight (d) All the above

Q7. During rainbow formation, a passenger in an aeroplane
(a) shall never see a rainbow.
(b) may see a primary and a secondary rainbow as concentric circles.
(c) may see a primary and a secondary rainbow as concentric arcs.
(d) shall never see a secondary rainbow.

Q8. The state of a gas can be described by quoting the relationship between_____.
(a) pressure, volume, temperature
(b) temperature, amount, pressure
(c) amount, volume, temperature
(d) pressure, volume, temperature, amount

Q9. Which of the following is not a lymphoid tissue?
(a) Spleen (b) Tonsils
(c) Pancreas (d) Thymus

Q10. In a permanent magnet at room temperature
(a) magnetic moment of each molecule is zero.
(b) the individual molecules have non-zero magnetic moment which are all perfectly aligned.
(c) domains are partially aligned.
(d) domains are all perfectly aligned.

Q11. The period number in the long form of the periodic table is equal to
(a) magnetic quantum number of any element of the period.
(b) atomic number of any element of the period.
(c) maximum Principal quantum number of any element of the period.
(d) maximum Azimuthal quantum number of any element of the period.

Q12. Which of the following glands is large sized at birth but reduces in size with ageing?
(a) Pineal (b) Pituitary
(c) Thymus (d) Thyroid

Q13. Motion of an oscillating liquid column in a U-tube is
(a) periodic but not simple harmonic
(b) non-periodic
(c) simple harmonic and time period is independent of the density of the liquid
(d) simple harmonic and time-period is directly proportional to the density of the liquid

Q14. As the temperature increases, average kinetic energy of molecules increases. What would be the effect of increase of temperature on pressure provided the volume is constant?
(a) increases (b) decreases
(c) remains same (d) becomes half

Q15. Which of the following organisms does not have both muscles and skeleton for movement?
(a) dog (b) snail
(c) earthworm (d) human being

Q16. Which of the following characteristics of electrons determines the current in a conductor?
(a) Drift velocity alone (b) Thermal velocity alone
(c) Both drift velocity and thermal velocity
(d) Neither drift nor thermal velocity

Q17. Sewage containing organic waste should not be disposed in water bodies because it causes major water pollution. Fishes in such a polluted water die because of
(a) Large number of mosquitoes
(b) Increase in the amount of dissolved oxygen
(c) Decrease in the amount of dissolved oxygen in water
(d) Clogging of gills by mud

Q18. Which of the following does not lose their nucleus at maturity?
(a) Companion cells (b) Red blood cells
(c) Vessel (d) Sieve tube cells

Q19. Which from the following is true for "Sound"?
(a) Sound cannot travel through a vacuum
(b) Sound cannot travel through gases
(c) Sound cannot travel through liquids
(d) Sound cannot travel through solids

Q20. The gas, commonly known as "laughing gas", is
(a) Carbon Dioxide (b) Sulphur Dioxide
(c) Nitrous Oxide (d) Sodium Oxide

Q21. Amphibians do not have the following
(a) Three chambered heart (b) Gills or lungs
(c) Scales (d) Mucus glands

Q22. Which of the following can be used to form a real image always?
(a) Concave mirror only (b) Plane mirror only
(c) Convex mirror only (d) None of these

Q23. What is Dry Ice?
(a) Solid Oxygen (b) Solid Nitrogen
(c) Solid Hydrogen (d) Solid Carbon Dioxide

Q24. Girth of stem increases due to
(a) apical meristem (b) lateral meristem
(c) intercalary meristem (d) vertical meristem

Q25. Which of the following statements is wrong?
(a) Ozone is not responsible for greenhouse effect.
(b) Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide.
(c) Ozone hole is thinning of ozone layer present in stratosphere.
(d) Ozone is produced in upper stratosphere by the action of UV rays on oxygen.

Q26. The _____ is the point of intersection of the three angle bisectors of a triangle.
(a) Incenter (b) Orthocenter
(c) Centroid (d) Circumcenter

Q27. "Every Drop Counts" is a slogan related to
(a) counting of drops of any liquid.
(b) counting of water drops.
(c) importance of water.
(d) importance of counting

Q28. What is the name of the instrument used to measure motions underground, including those of waves generated by earthquakes, volcanic eruptions?
(a) Seismometer (b) Anemometer
(c) Barometer (d) Thermometer

Q29. Every year, National Mathematics Day is observed on -
(a) 22nd September (b) 21st June
(c) 21st March (d) 22nd December

Q30. 1 nanometer = ?
(a) 10^{-3} meter (b) 10^{-6} meter
(c) 10^{-9} meter (d) 10^{-12} meter

Q31. The earth is an approximate sphere. If the interior contained matter which is not of the same density everywhere, then on the surface of the earth, the acceleration due to gravity
(a) will be directed towards the centre but not the same everywhere.
(b) will have the same value everywhere but not directed towards the centre.
(c) will be same everywhere in magnitude directed towards the centre.
(d) cannot be zero at any point.

Q32. The organisms which cause diseases in plants and animals are called:
(a) Pathogens (b) Vectors
(c) Insects (d) Worms

Q33. The oxidant which is used as an antiseptic is
(a) $KBrO_3$ (b) $KMnO_4$
(c) CrO_3 (d) KNO_3

Q34. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponent. The force that acts on the player is
(a) frictional force along westward.
(b) muscle force along southward.
(c) frictional force along south-west.
(d) muscle force along south-west.

Q35. In malignant tumors, the cells proliferate, grow rapidly and move to other parts of the body to form new tumors. This stage of disease is called:
(a) metagenesis (b) metastasis
(c) teratogenesis (d) mitosis

Q36. Every rational number is
(a) a natural number (b) an integer
(c) a real number (d) a whole number

Q37. The change in seasons on the earth occurs because
(a) the distance between the earth and the sun is not constant.
(b) the axis of rotation of the earth is parallel to the plane of its orbit.
(c) the axis of rotation of the earth is perpendicular to the plane of its orbit.
(d) the axis of rotation of the earth is tilted with respect to the plane of its orbit.

Q38. If your diet is deficient in sour fruits then you are supposed to suffer from
(a) Rickets (b) Beri Beri
(c) Scurvy (d) Night blindness.

Q39. When a disc rotates with uniform angular velocity, which of the following is not true?
(a) The sense of rotation remains same.
(b) The orientation of the axis of rotation remains same.
(c) The speed of rotation is non-zero and remains same.
(d) The angular acceleration is non-zero and remains same.

Q40. Pick one material from the following which is completely soluble in water.
(a) Chalk powder (b) Tea leaves
(c) Glucose (d) Saw dust

Q41. Spinal cord originates from:
(a) Cerebrum (b) Cerebellum
(c) Medulla (d) Pons

Q42. Which of the following letters does not have any line of symmetry?
(a) E (b) T
(c) N (d) X

Q43. BOD of waste water is estimated by measuring the amount of:
(a) total organic matter
(b) biodegradable organic matter
(c) oxygen evolution
(d) oxygen consumption

Q44. Which of the following statements about the electron is incorrect?
(a) It is a negatively charged particle.
(b) The mass of electron is equal to the mass of neutron.
(c) It is a basic constituent of all atoms.
(d) It is a constituent of cathode rays

Q45. Which gas is produced on burning of fossil fuels?
(a) Sulphur dioxide (b) Oxygen
(c) Nitrogen (d) Carbon dioxide

Q46. The primary treatment of waste water involves the removal of:
(a) dissolved impurities (b) stable particles
(c) toxic substances (d) harmful bacteria

Q47. He was a mathematician and physicist; best known for his collaboration with Albert Einstein in formulating a theory related to the gas like qualities of electromagnetic radiation. Name the scientist.
(a) P. C. Mahalanobis (b) Meghnad Saha
(c) S. Chandrasekhar (d) S. N. Bose

Q48. The clinical test that is used for diagnosis of typhoid is:
(a) ELISA (b) ESR
(c) PCR (d) Widal

Q49. The maximum load a wire can withstand without breaking, when its length is reduced to half of its original length, will
(a) be double.
(b) be half.
(c) be four times.
(d) remain same.

Q50. Ice is floating on water in a beaker when ice completely melts then level of water in beaker:
(a) Increases (b) Remains the same
(c) Decreases (d) First increases then decreases

Q51. Which of the following is used as an atmospheric pollution indicator?
(a) Lepidoptera (b) Lichens
(c) Lycopersicon (d) Lycopodium

Q52. Ultrasound has frequency of vibration
(a) between 20 and 20,000 Hz
(b) below 20 Hz
(c) above 20,000 Hz
(d) between 500 and 10,000 Hz

Q53.'Smack' is a drug obtained from the:
(a) latex of Papaver somniferum
(b) leaves of Cannabis sativa
(c) flowers of Dhatura
(d) fruits of Erythroxyl coca

Q54. Which of the following pairs of physical quantities does not have same dimensional formula?
(a) Work and torque.
(b) Angular momentum and Planck's constant.
(c) Tension and surface tension.
(d) Impulse and linear momentum.

Q55. Animal husbandry and plant breeding programmes are the examples of:
(a) reverse evolution (b) artificial selection
(c) mutation (d) natural selection

Q56. Which one of the following is true for all chemical reactions?
(a) There is a change in volume
(b) Heat is evolved
(c) Chemical bonds are broken or formed
(d) There is a change in mass

Q57. The term "water-pollution" can be defined in several ways. Which of the following statements does not give the correct definition?
(a) The addition of undesirable substances to water-bodies
(b) The removal of desirable substances from water-bodies
(c) A change in pressure of the water bodies
(d) A change in temperature of the water bodies

Q58. All genes located on the same chromosome:
(a) Form different groups depending upon their relative distance
(b) Form one linkage group
(c) Will not from any linkage groups
(d) Form interactive groups that affect the phenotype

Q59. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light
(a) is scattered the most by smoke or fog
(b) is scattered the least by smoke or fog
(c) is absorbed the most by smoke or fog
(d) moves fastest in air

Q60. Rocket works on the principle of conservation of
(a) mass (b) energy
(c) momentum (d) velocity

Section-B (40 Marks)
(Life Sciences)

5

(Descriptive type)

Note- Question numbers 1 to 5 carry 2 marks each. Question numbers 6 to 10 carry 4 marks each. Question 11 having two parts carries 5 marks each.

Q1. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason.

Q2. A woman has only daughters. Analyse the situation genetically and provide a suitable explanation.

Q3. Give reasons why acquired characters are not inherited.

Q4. What is a clone? Why do offspring formed by asexual reproduction exhibit remarkable similarity?

Q5. A fluid filled double membranous layer surrounds the lungs. Name it and mention its important function.

Q6. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?

Q7. Palm is a monocotyledonous plant, yet it increases in girth. Why and how?

Q8. Name the part of the alimentary canal where major absorption of digested food takes place. What are the absorbed forms of different kinds of food materials?

Q9. Differentiate between Blood and Lymph.

Q10. How does deforestation lead to frequent floods and droughts?

Q11. Write short notes on **any two** of the following:

(a) Climate change & Global warming
(b) COVID-19 pandemic –Prevention & Control
(c) Hepatitis – a global threat to human health
(d) Human Gene editing – Good or Bad?
(e) Endangered Species

Section-B (40 Marks)
(Physical Sciences)
(Descriptive type)

Note- Question numbers 1 to 5 carry 2 marks each. Question numbers 6 to 10 carry 4 marks each. Question 11 having two parts carries 5 marks each.

Q1. There are three solids made up of aluminium, steel and wood, of the same shape and same volume. Which of them would have highest inertia & why?
Ans. Steel. As the mass is a measure of inertia, the ball of same shape and size, having more mass than other balls will have highest inertia. Since steel has greatest density and greatest mass, therefore, it has highest inertia.

Q2. Can any object have momentum even if its mechanical energy is zero? Explain.
Ans. No. Since mechanical energy is zero, there is no potential energy and no kinetic energy. Kinetic energy being zero, velocity is zero. Hence, there will be no momentum.

Q3. The displacement of a moving object in a given interval of time is zero. Would the distance travelled by the object also be zero? Justify you answer.
Ans. No. Though the moving object comes back to its initial position the distance travelled is not zero.

Q4. You are given two samples of water labelled as 'A' and 'B'. Sample 'A' boils at 100°C and sample 'B' boils at 102°C. Which sample of water will not freeze at 0°C? Comment.
Ans. Sample 'B' will not freeze at 0°C because it is not pure water. At 1 atm, the boiling point of pure water is 100°C and the freezing point of pure water is 0°C.

Q5. A body falls towards earth in air. Will its total mechanical energy be conserved during the fall? Justify.
Ans. No, because resistive force of air also acts on the body which is a non-conservative force. So the gain in KE would be smaller than the loss in PE.

Q6. Why does a metal bar appear hotter than a wooden bar at the same temperature? Equivalently it also appears cooler than wooden bar if they are both colder than room temperature.
Ans. Due to difference in conductivity, metals having high conductivity compared to wood. On touch with a finger, heat from the surrounding flows faster to the finger from metals and so one feels the heat. Similarly, when one touches a cold metal the heat from the finger flows away to the surroundings faster.

Q7. Two bodies of unequal mass are moving in the same direction with equal kinetic energy. The two bodies are brought to rest by applying retarding force of same magnitude. How would the distance moved by them before coming to rest? Compare?
Ans. Work done = change in KE
Both bodies had same KE and hence same amount of work is needed to be done. Since force applied is same, they would come to rest within the same distance.

Q8. Pressure cooker is used for cooking food at hill station. Explain in terms of vapour pressure why is it so?
Ans. A liquid boils when vapour pressure becomes equal to the atmospheric pressure. Water boils at low temperature on hills because atmospheric pressure is low. Therefore even at low temperature vapour pressure becomes equal to atmospheric pressure.

Q9. When 500 mL of water and 500 mL of ethanol are mixed the resulting volume is less than 1 L. How?
Ans. The total mass of substances does not change during a chemical reaction. When one volume of liquid is mixed with another volume of liquid that is less dense than the first, the total volume of the two liquids will not be the sum of the two individual liquids. The molecules of one liquid can fill in the volume between the molecules of another.

Q10. Two burning candles of same thickness and different length are covered by a tumbler glass. Which one will extinguish first or both will extinguish at the same time? Explain.